

## SEQUENCE LISTING

<110> Plantechno S.r.l.  
Plantechno S.r.l.

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<150> RM2002A000115

<151> 2002-01-03

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<170> PatentIn version 3.1

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Val Lys Gly Phe Gly Gly Ala Met Thr Asp Ala Ala Ala Leu Asn Ile	
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Leu Ala Leu Ser Pro Pro Ala Gln Asn Leu Leu Leu Lys Ser Tyr Phe	
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tct gaa gaa gga atc gga tat aac atc atc cgg gta ccc atg gcc agc	432
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Cys Asp Phe Ser Ile Arg Thr Tyr Thr Tyr Ala Asp Thr Pro Asp Asp	
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ttc cag ttg cac aac ttc agc ctc cca gag gaa gat acc aag ctc aag	528
Phe Gln Leu His Asn Phe Ser Leu Pro Glu Glu Asp Thr Lys Leu Lys	
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Ile Pro Leu Ile His Arg Ala Leu Gln Leu Ala Gln Arg Pro Val Ser	
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Leu Leu Ala Ser Pro Trp Thr Ser Pro Thr Trp Leu Lys Thr Asn Gly	
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His Gln Thr Trp Ala Arg Tyr Phe Val Lys Phe Leu Asp Ala Tyr Ala	
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Glu His Lys Leu Gln Phe Trp Ala Val Thr Ala Glu Asn Glu Pro Ser	
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Ala Gly Leu Leu Ser Gly Tyr Pro Phe Gln Cys Leu Gly Phe Thr Pro	
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Glu His Gln Arg Asp Phe Ile Ala Arg Asp Leu Gly Pro Thr Leu Ala	
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cag	agt	gtg	cgg	cta	ggc	tcc	tgg	gat	cga	ggg	atg	cag	tac	agc	cac		1152
Gln	Ser	Val	Arg	Leu	Gly	Ser	Trp	Asp	Arg	Gly	Met	Gln	Tyr	Ser	His		
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Ser	Ile	Ile	Thr	Asn	Leu	Leu	Tyr	His	Val	Val	Gly	Trp	Thr	Asp	Trp		
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gtc	gac	agt	ccc	atc	att	gta	gac	atc	acc	aag	gac	acg	ttt	tac	aaa		1296
Val	Asp	Ser	Pro	Ile	Ile	Val	Asp	Ile	Thr	Lys	Asp	Thr	Phe	Tyr	Lys		
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Gly	Ser	Gln	Arg	Val	Gly	Leu	Val	Ala	Ser	Gln	Lys	Asn	Asp	Leu	Asp		
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gca	gtg	gca	ctg	atg	cat	ccc	gat	ggc	tct	gct	gtt	gtg	gtc	gtg	cta		1440
Ala	Val	Ala	Leu	Met	His	Pro	Asp	Gly	Ser	Ala	Val	Val	Val	Val	Leu		
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Asn	Arg	Ser	Ser	Lys	Asp	Val	Pro	Leu	Thr	Ile	Lys	Asp	Pro	Ala	Val		
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Trp	His	Arg	Gln														
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Glu His Lys Leu Gln Phe Trp Ala Val Thr Ala Glu Asn Glu Pro Ser  
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Ala Gly Leu Leu Ser Gly Tyr Pro Phe Gln Cys Leu Gly Phe Thr Pro  
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Ala Lys Tyr Val His Gly Ile Ala Val His Trp Tyr Leu Asp Phe Leu  
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Ser Ile Ile Thr Asn Leu Leu Tyr His Val Val Gly Trp Thr Asp Trp  
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Val Asp Ser Pro Ile Ile Val Asp Ile Thr Lys Asp Thr Phe Tyr Lys  
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Ala Val Ala Leu Met His Pro Asp Gly Ser Ala Val Val Val Val Leu  
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Asn Arg Ser Ser Lys Asp Val Pro Leu Thr Ile Lys Asp Pro Ala Val  
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 Gly Cys Ala Leu Ala Leu Arg Phe Leu Ala Leu Val Ser Trp Asp Ile  
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cct ggg gct aga gca ctg gac aat gga ttg gca agg acg cct acc atg 149  
 Pro Gly Ala Arg Ala Leu Asp Asn Gly Leu Ala Arg Thr Pro Thr Met  
 -5 -1 1 5 10



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gag cca gat tcc tgc atc agt gag aag ctc ttc atg gag atg gca gag Glu Pro Asp Ser Cys Ile Ser Glu Lys Leu Phe Met Glu Met Ala Glu 30 35 40	245
ctc atg gtc tca gaa ggc tgg aag gat gca ggt tat gag tac ctc tgc Leu Met Val Ser Glu Gly Trp Lys Asp Ala Gly Tyr Glu Tyr Leu Cys 45 50 55	293
att gat gac tgt tgg atg gct ccc caa aga gat tca gaa ggc aga ctt Ile Asp Asp Cys Trp Met Ala Pro Gln Arg Asp Ser Glu Gly Arg Leu 60 65 70 75	341
cag gca gac cct cag cgc ttt cct cat ggg att cgc cag cta gct aat Gln Ala Asp Pro Gln Arg Phe Pro His Gly Ile Arg Gln Leu Ala Asn 80 85 90	389
tat gtt cac agc aaa gga ctg aag cta ggg att tat gca gat gtt gga Tyr Val His Ser Lys Gly Leu Lys Leu Gly Ile Tyr Ala Asp Val Gly 95 100 105	437
aat aaa acc tgc gca ggc ttc cct ggg agt ttt gga tac tac gac att Asn Lys Thr Cys Ala Gly Phe Pro Gly Ser Phe Gly Tyr Tyr Asp Ile 110 115 120	485
gat gcc cag acc ttt gct gac tgg gga gta gat ctg cta aaa ttt gat Asp Ala Gln Thr Phe Ala Asp Trp Gly Val Asp Leu Leu Lys Phe Asp 125 130 135	533
ggg tgt tac tgt gac agt ttg gaa aat ttg gca gat ggt tat aag cac Gly Cys Tyr Cys Asp Ser Leu Glu Asn Leu Ala Asp Gly Tyr Lys His 140 145 150 155	581
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gag tgg cct ctt tat atg tgg ccc ttt caa aag ccc aat tat aca gaa Glu Trp Pro Leu Tyr Met Trp Pro Phe Gln Lys Pro Asn Tyr Thr Glu 175 180 185	677
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gag aga att gtt gat gtt gct gga cca ggg ggt tgg aat gac cca gat Glu Arg Ile Val Asp Val Ala Gly Pro Gly Gly Trp Asn Asp Pro Asp 220 225 230 235	821
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Gln	Met	Ala	Leu	Trp	Ala	Ile	Met	Ala	Ala	Pro	Leu	Phe	Met	Ser	Asn	
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Asp	Leu	Arg	His	Ile	Ser	Pro	Gln	Ala	Lys	Ala	Leu	Leu	Gln	Asp	Lys	
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Arg	Ser	Tyr	Thr	Ile	Ala	Val	Ala	Ser	Leu	Gly	Lys	Gly	Val	Ala	Cys	
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Asn	Pro	Ala	Cys	Phe	Ile	Thr	Gln	Leu	Leu	Pro	Val	Lys	Arg	Lys	Leu	
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Gly	Phe	Tyr	Glu	Trp	Thr	Ser	Arg	Leu	Arg	Ser	His	Ile	Asn	Pro	Thr	
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Gly	Thr	Val	Leu	Leu	Gln	Leu	Glu	Asn	Thr	Met	Gln	Met	Ser	Leu	Lys	
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Asp	Leu	Leu														

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Met	Ala	Pro	Gln	Arg	Asp	Ser	Glu	Gly	Arg	Leu	Gln	Ala	Asp	Pro	Gln	65	70	75	80
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Ala	Asp	Trp	Gly	Val	Asp	Leu	Leu	Lys	Phe	Asp	Gly	Cys	Tyr	Cys	Asp	130	135	140	
Ser	Leu	Glu	Asn	Leu	Ala	Asp	Gly	Tyr	Lys	His	Met	Ser	Leu	Ala	Leu	145	150	155	160
Asn	Arg	Thr	Gly	Arg	Ser	Ile	Val	Tyr	Ser	Cys	Glu	Trp	Pro	Leu	Tyr	165	170	175	
Met	Trp	Pro	Phe	Gln	Lys	Pro	Asn	Tyr	Thr	Glu	Ile	Arg	Gln	Tyr	Cys	180	185	190	
Asn	His	Trp	Arg	Asn	Phe	Ala	Asp	Ile	Asp	Asp	Ser	Trp	Lys	Ser	Ile	195	200	205	
Lys	Ser	Ile	Leu	Asp	Trp	Thr	Ser	Phe	Asn	Gln	Glu	Arg	Ile	Val	Asp	210	215	220	

Val Ala Gly Pro Gly Gly Trp Asn Asp Pro Asp Met Leu Val Ile Gly  
225 230 235 240

Asn Phe Gly Leu Ser Trp Asn Gln Gln Val Thr Gln Met Ala Leu Trp  
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Ala Ile Met Ala Ala Pro Leu Phe Met Ser Asn Asp Leu Arg His Ile  
260 265 270

Ser Pro Gln Ala Lys Ala Leu Leu Gln Asp Lys Asp Val Ile Ala Ile  
275 280 285

Asn Gln Asp Pro Leu Gly Lys Gln Gly Tyr Gln Leu Arg Gln Gly Asp  
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Asn Phe Glu Val Trp Glu Arg Pro Leu Ser Gly Leu Ala Trp Ala Val  
305 310 315 320

Ala Met Ile Asn Arg Gln Glu Ile Gly Gly Pro Arg Ser Tyr Thr Ile  
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Ala Val Ala Ser Leu Gly Lys Gly Val Ala Cys Asn Pro Ala Cys Phe  
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Ile Thr Gln Leu Leu Pro Val Lys Arg Lys Leu Gly Phe Tyr Glu Trp  
355 360 365

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or native signal peptide

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 gccag gca cac ccc ggc cgt ccc aga gca gtg ccc aca cag tgc gac 468  
 Ala His Pro Gly Arg Pro Arg Ala Val Pro Thr Gln Cys Asp  
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 gtc ccc ccc aac agc cgc ttc gat tgc gcc cct gac aag gcc atc acc 516  
 Val Pro Pro Asn Ser Arg Phe Asp Cys Ala Pro Asp Lys Ala Ile Thr  
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Gln	Glu	Gln	Cys	Glu	Ala	Arg	Gly	Cys	Cys	Tyr	Ile	Pro	Ala	Lys	Gln	
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ggg	ctg	cag	gga	gcc	cag	atg	ggg	cag	ccc	tgg	tgc	ttc	ttc	cca	ccc	612
Gly	Leu	Gln	Gly	Ala	Gln	Met	Gly	Gln	Pro	Trp	Cys	Phe	Phe	Pro	Pro	
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agc	tac	ccc	agc	tac	aag	ctg	gag	aac	ctg	agc	tcc	tct	gaa	atg	ggc	660
Ser	Tyr	Pro	Ser	Tyr	Lys	Leu	Glu	Asn	Leu	Ser	Ser	Ser	Glu	Met	Gly	
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Tyr	Thr	Ala	Thr	Leu	Thr	Arg	Thr	Thr	Pro	Thr	Phe	Phe	Pro	Lys	Asp	
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atc	ctg	acc	ctg	cgg	ctg	gac	gtg	atg	atg	gag	act	gag	aac	cgc	ctc	756
Ile	Leu	Thr	Leu	Arg	Leu	Asp	Val	Met	Met	Glu	Thr	Glu	Asn	Arg	Leu	
95					100					105					110	
cac	ttc	acg	atc	aaa	gat	cca	gct	aac	agg	cgc	tac	gag	gtg	ccc	ttg	804
His	Phe	Thr	Ile	Lys	Asp	Pro	Ala	Asn	Arg	Arg	Tyr	Glu	Val	Pro	Leu	
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gag	acc	ccg	cgt	gtc	cac	agc	cgg	gca	ccg	tcc	cca	ctc	tac	agc	gtg	852
Glu	Thr	Pro	Arg	Val	His	Ser	Arg	Ala	Pro	Ser	Pro	Leu	Tyr	Ser	Val	
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Glu	Phe	Ser	Glu	Glu	Pro	Phe	Gly	Val	Ile	Val	His	Arg	Gln	Leu	Asp	
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Gly	Arg	Val	Leu	Leu	Asn	Thr	Thr	Val	Ala	Pro	Leu	Phe	Phe	Ala	Asp	
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Gln	Phe	Leu	Gln	Leu	Ser	Thr	Ser	Leu	Pro	Ser	Gln	Tyr	Ile	Thr	Gly	
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ctc	gcc	gag	cac	ctc	agt	ccc	ctg	atg	ctc	agc	acc	agc	tgg	acc	agg	1044
Leu	Ala	Glu	His	Leu	Ser	Pro	Leu	Met	Leu	Ser	Thr	Ser	Trp	Thr	Arg	
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atc	acc	ctg	tgg	aac	cgg	gac	ctt	gcg	ccc	acg	ccc	ggg	gcg	aac	ctc	1092
Ile	Thr	Leu	Trp	Asn	Arg	Asp	Leu	Ala	Pro	Thr	Pro	Gly	Ala	Asn	Leu	
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tac	ggg	tct	cac	cct	ttc	tac	ctg	gcg	ctg	gag	gac	ggc	ggg	tcg	gca	1140
Tyr	Gly	Ser	His	Pro	Phe	Tyr	Leu	Ala	Leu	Glu	Asp	Gly	Gly	Ser	Ala	
		225					230					235				
cac	ggg	gtg	ttc	ctg	cta	aac	agc	aat	gcc	atg	gat	gtg	gtc	ctg	cag	1188
His	Gly	Val	Phe	Leu	Leu	Asn	Ser	Asn	Ala	Met	Asp	Val	Val	Leu	Gln	
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ccg	agc	cct	gcc	ctt	agc	tgg	agg	tcg	aca	ggg	ggg	atc	ctg	gat	gtc	1236
Pro	Ser	Pro	Ala	Leu	Ser	Trp	Arg	Ser	Thr	Gly	Gly	Ile	Leu	Asp	Val	

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tac atc ttc ctg ggc cca gag ccc aag agc gtg gtg cag cag tac ctg Tyr Ile Phe Leu Gly Pro Glu Pro Lys Ser Val Val Gln Gln Tyr Leu 275 280 285				1284
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tcc act gcc ttc ccc gac ttc acc aac ccc aca gcc ctg gcc tgg tgg Ser Thr Ala Phe Pro Asp Phe Thr Asn Pro Thr Ala Leu Ala Trp Trp 415 420 425 430				1716
gag gac atg gtg gct gag ttc cat gac cag gtg ccc ttc gac ggc atg Glu Asp Met Val Ala Glu Phe His Asp Gln Val Pro Phe Asp Gly Met 435 440 445				1764
tgg att gac atg aac gag cct tcc aac ttc atc aga ggc tct gag gac Trp Ile Asp Met Asn Glu Pro Ser Asn Phe Ile Arg Gly Ser Glu Asp 450 455 460				1812
ggc tgc ccc aac aat gag ctg gag aac cca ccc tac gtg cct ggg gtg Gly Cys Pro Asn Asn Glu Leu Glu Asn Pro Pro Tyr Val Pro Gly Val 465 470 475				1860
gtt ggg ggg acc ctc cag gcg gcc acc atc tgt gcc tcc agc cac cag Val Gly Gly Thr Leu Gln Ala Ala Thr Ile Cys Ala Ser Ser His Gln 480 485 490				1908

ttt ctc tcc aca cac tac aac ctg cac aac ctc tac ggc ctg acc gaa	1956
Phe Leu Ser Thr His Tyr Asn Leu His Asn Leu Tyr Gly Leu Thr Glu	
495 500 505 510	
gcc atc gcc tcc cac agg gcg ctg gtg aag gct cgg ggg aca cgc cca	2004
Ala Ile Ala Ser His Arg Ala Leu Val Lys Ala Arg Gly Thr Arg Pro	
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Phe Val Ile Ser Arg Ser Thr Phe Ala Gly His Gly Arg Tyr Ala Gly	
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His Trp Thr Gly Asp Val Trp Ser Ser Trp Glu Gln Leu Ala Ser Ser	
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Val Pro Glu Ile Leu Gln Phe Asn Leu Leu Gly Val Pro Leu Val Gly	
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Ala Asp Val Cys Gly Phe Leu Gly Asn Thr Ser Glu Glu Leu Cys Val	
575 580 585 590	
cgc tgg acc cag ctg ggg gcc ttc tac ccc ttc atg cgg aac cac aac	2244
Arg Trp Thr Gln Leu Gly Ala Phe Tyr Pro Phe Met Arg Asn His Asn	
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Ser Leu Leu Ser Leu Pro Gln Glu Pro Tyr Ser Phe Ser Glu Pro Ala	
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Gln Gln Ala Met Arg Lys Ala Leu Thr Leu Arg Tyr Ala Leu Leu Pro	
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His Leu Tyr Thr Leu Phe His Gln Ala His Val Ala Gly Glu Thr Val	
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Ala Arg Pro Leu Phe Leu Glu Phe Pro Lys Asp Ser Ser Thr Trp Thr	
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Val Asp His Gln Leu Leu Trp Gly Glu Ala Leu Leu Ile Thr Pro Val	
675 680 685	
ctc cag gcc ggg aag gcc gaa gtg act ggc tac ttc ccc ttg ggc aca	2532
Leu Gln Ala Gly Lys Ala Glu Val Thr Gly Tyr Phe Pro Leu Gly Thr	
690 695 700	
tgg tac gac ctg cag acg gtg cca ata gag gcc ctt ggc agc ctc cca	2580
Trp Tyr Asp Leu Gln Thr Val Pro Ile Glu Ala Leu Gly Ser Leu Pro	
705 710 715	



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tgg gtg acg ctg ccg gcc ccc ctg gac acc atc aac gtc cac ctc cgg Trp Val Thr Leu Pro Ala Pro Leu Asp Thr Ile Asn Val His Leu Arg 735 740 745 750	2676
gct ggg tac atc atc ccc ctg cag ggc cct ggc ctc aca acc aca gag Ala Gly Tyr Ile Ile Pro Leu Gln Gly Pro Gly Leu Thr Thr Thr Glu 755 760 765	2724
tcc cgc cag cag ccc atg gcc ctg gct gtg gcc ctg acc aag ggt gga Ser Arg Gln Gln Pro Met Ala Leu Ala Val Ala Leu Thr Lys Gly Gly 770 775 780	2772
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ctg gag cga ggg gcc tac aca cag gtc atc ttc ctg gcc agg aat aac Leu Glu Arg Gly Ala Tyr Thr Gln Val Ile Phe Leu Ala Arg Asn Asn 800 805 810	2868
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cag ctg cag aag gtg act gtc ctg ggc gtg gcc acg gcg ccc cag cag Gln Leu Gln Lys Val Thr Val Leu Gly Val Ala Thr Ala Pro Gln Gln 835 840 845	2964
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Pro Ser Tyr Lys Leu Glu Asn Leu Ser Ser Ser Glu Met Gly Tyr Thr  
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Ala Thr Leu Thr Arg Thr Thr Pro Thr Phe Phe Pro Lys Asp Ile Leu  
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Thr Leu Arg Leu Asp Val Met Met Glu Thr Glu Asn Arg Leu His Phe  
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Thr Ile Lys Asp Pro Ala Asn Arg Arg Tyr Glu Val Pro Leu Glu Thr  
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Pro Arg Val His Ser Arg Ala Pro Ser Pro Leu Tyr Ser Val Glu Phe  
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Ser Glu Glu Pro Phe Gly Val Ile Val His Arg Gln Leu Asp Gly Arg  
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Val Leu Leu Asn Thr Thr Val Ala Pro Leu Phe Phe Ala Asp Gln Phe  
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Leu Gln Leu Ser Thr Ser Leu Pro Ser Gln Tyr Ile Thr Gly Leu Ala  
180 185 190

Glu His Leu Ser Pro Leu Met Leu Ser Thr Ser Trp Thr Arg Ile Thr  
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Leu Trp Asn Arg Asp Leu Ala Pro Thr Pro Gly Ala Asn Leu Tyr Gly  
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Ser His Pro Phe Tyr Leu Ala Leu Glu Asp Gly Gly Ser Ala His Gly  
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Val Phe Leu Leu Asn Ser Asn Ala Met Asp Val Val Leu Gln Pro Ser  
245 250 255

Pro Ala Leu Ser Trp Arg Ser Thr Gly Gly Ile Leu Asp Val Tyr Ile  
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Phe Leu Gly Pro Glu Pro Lys Ser Val Val Gln Gln Tyr Leu Asp Val  
275 280 285

Val Gly Tyr Pro Phe Met Pro Pro Tyr Trp Gly Leu Gly Phe His Leu  
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Cys Arg Trp Gly Tyr Ser Ser Thr Ala Ile Thr Arg Gln Val Val Glu  
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Asn Met Thr Arg Ala His Phe Pro Leu Asp Val Gln Trp Asn Asp Leu  
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Asp Tyr Met Asp Ser Arg Arg Asp Phe Thr Phe Asn Lys Asp Gly Phe  
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Tyr Met Met Ile Val Asp Pro Ala Ile Ser Ser Ser Gly Pro Ala Gly  
370 375 380

Ser Tyr Arg Pro Tyr Asp Glu Gly Leu Arg Arg Gly Val Phe Ile Thr  
385 390 395 400

Asn Glu Thr Gly Gln Pro Leu Ile Gly Lys Val Trp Pro Gly Ser Thr

405

410

415

Ala Phe Pro Asp Phe Thr Asn Pro Thr Ala Leu Ala Trp Trp Glu Asp  
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Met Val Ala Glu Phe His Asp Gln Val Pro Phe Asp Gly Met Trp Ile  
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Gly Thr Leu Gln Ala Ala Thr Ile Cys Ala Ser Ser His Gln Phe Leu  
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Ser Thr His Tyr Asn Leu His Asn Leu Tyr Gly Leu Thr Glu Ala Ile  
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Ala Met Arg Lys Ala Leu Thr Leu Arg Tyr Ala Leu Leu Pro His Leu  
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Tyr Thr Leu Phe His Gln Ala His Val Ala Gly Glu Thr Val Ala Arg  
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His Gln Leu Leu Trp Gly Glu Ala Leu Leu Ile Thr Pro Val Leu Gln  
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Ala Gly Lys Ala Glu Val Thr Gly Tyr Phe Pro Leu Gly Thr Trp Tyr  
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Asp Leu Gln Thr Val Pro Ile Glu Ala Leu Gly Ser Leu Pro Pro Pro  
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Pro Ala Ala Pro Arg Glu Pro Ala Ile His Ser Glu Gly Gln Trp Val  
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Thr Leu Pro Ala Pro Leu Asp Thr Ile Asn Val His Leu Arg Ala Gly  
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Tyr Ile Ile Pro Leu Gln Gly Pro Gly Leu Thr Thr Thr Glu Ser Arg  
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Gln Gln Pro Met Ala Leu Ala Val Ala Leu Thr Lys Gly Gly Glu Ala  
770 775 780

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785 790 795 800

Arg Gly Ala Tyr Thr Gln Val Ile Phe Leu Ala Arg Asn Asn Thr Ile  
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820 825 830

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835 840 845

Ser Asn Gly Val Pro Val Ser Asn Phe Thr Tyr Ser Pro Asp Thr Lys  
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or native signal peptide

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